Lowering Costs with „Lentil Soup"!

CUTEC NEWS

FACTS · INFORMATION · ANALYSES

Nr_3 www.cutec.de September 2003

Impressive Values

Yes, even Environmental Technology can make a valuable impression. Take for example the allowable limit of dioxin in a cubic meter of air: 0.1 nanogram. This is about 187 600 000 000 molecules of dioxin per cubic meter air; more than enough molecules for a contamination. On the more valuable side look at the expected production increase of biodiesel from 800 000 t year 2002 to 1 200 000 t for this year; yet only about 3 % of Germany's total diesel consumption. All of this is just about as valuable as the number of characters in this editorial, in fact: 1 498. CUTEC doesn't want to impress with values.

Multi-disciplined approaches first appeared in Environmental Technology relatively late. Now for example, recycling together with disposal is conceptualised as a total processing chain. In order to be able to find missing links in the conceptual chain, we are going to have to work on our thinking. CUTEC wants to value this way of thinking.

Numbers can show that our ideas like the Diesel Exhaust After Treatment (DEXA) and APV projects will quickly amortise. Yet they say very little about a value that I would like to describe as societal improvement. When we find how a waste water treatment plant can produce part of its own energy from its own sludge reducing at the same time solid waste, then we have made a contribution and lived up to our values.

Possibly only by leaving behind the approach of looking at problems as isolated and instead viewing those as part of a total phenomena are we going to be able to make such real contribution. Only broadly laid out areas of activity can always yield positive findings for neighbouring projects and areas. If we cannot work on a given project, we would at least like to be able to serve as a partner for discussions. We or someone we know might be able to help.

Yours,

Otto Carlowitz

IN THIS EDITION

Rape, a Special Plant

Yellow gold – no, not a misprint – much more a paradigm shift that in the near future will mean that the yellow flower clusters will become a metaphor for oil. We are talking about brassica napus or simply the rape plant. The name however comes from the Latin word rapum meaning root.

Rape belongs to the genus brassica, family cruciferae. Plants for oil seeds like those of brassica are among the oldest cultured plants, known first to have been used for about 10 000 years ago. Early drawings show that rape was used also in India 6 000 years ago. About 2 000 years ago use probably spread from China to Japan.

Rape has been used in southern Europe since the 12th century. Passing north over the Alps took another one hundred years. Rape oil was the main source for lamp oil until by the end of the 19th century petroleum took its place.

Today the golden rape fields means for many a renewable source for motor fuels. Rape methyl ester or biodiesel also means additional markets for farmers. In the last issue of CUTEC News we showed that with the ARTFUEL project not just the oil from the plant's fruit but that even the whole plant can be used. A total balance in terms of carbon dioxide shows itself to be very favourable. Which oil field can be more appealing then a rape field in full blo om? (kl)

New Technologies at the ACHEMA 2003

Visitors learning about the new CUTEC technologies

In May 2003 the 27th ACHEMA trade show for chemical, biological, and environmental technologies held every three years, took place in Frankfurt. With some 3800 exhibitors from 48 countries, it was the second biggest ACHEMA in its 83 year history. And with almost 200000 visitors from over 100 countries, ACHEMA is the world's largest trade-show and contact bourse.

CUTEC demonstrated its technological competence with its newest developments in the area of waste water treatment. The energy potential from sewage sludge was clearly shown in exhibits. Presentations showing recovery of acid salts from exhaust gases and hydrogen gas production for fuel cells also found heightened interest from experts.

Also taking part in the accompanying congress, CUTEC staff were part of meetings and discussions on new technologies. Back on the exhibition floor meetings with foreign representatives proved to be quite profitable.

The Dr. Wolfgang Koczott Chemical -Tech. Company GmbH, Ritterhude, was CUTEC's industrial partner from Lower Saxony at the floor exhibition. Their exhibition, Service and Development, dealt with client distillation. Here CUTEC demonstrated close cooperation with industry. Already CUTEC is planning to be at the ACHEMA 2006. (kra)

Scientific Highlight in Harz

4th Conference 2006 in Germany again

The 3rd International Conference for Waste Water Treatment met the high expectations of CUTEC and the Technical University Clausthal. In May 2003 Goslar became a mecca for the international experts in the field. Some 200 participants from 35 countries posed most critical questions on waste water treatment. Representatives from all five continents reported in 41 presentations and some 110 posters on progress in the oxidation process.

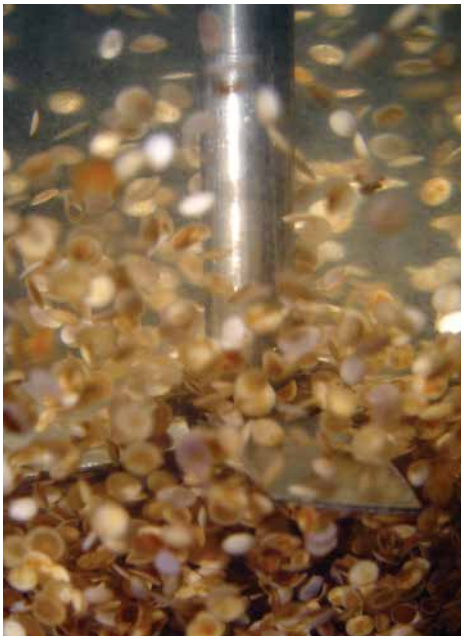
According the WHO and UNICEF one sixth of the earth's population do not have regular access to clean drinking water. These numbers will grow. Better methods for treating water are urgently needed, a challenge that the Conference took in its focus.

The Committee for Advanced Oxidation Processes (AOP) of the International Water Association (IWA) also met at the congress bringing together results from research and development, indicating where industry can help world wide. This panel, which also makes up the scientific committee of the AOP, will be publishing the outstanding presentations of the AOP 2003 (AOP3) bound as a volume for the series in the Water, Science and Technology of the IWA. The task force offers a platform for international discussion on oxidative water treatment.

Participants and the scientific committee saw the AOP3 conference as positive. AOP4 will meet again in Goslar in 2006. (kra)

Dr. Christian Eberl, Secretary Lower Saxony Ministry for Environment, in his welcoming address

„Lentil Soup“



„Lentil Soup“ (LentiKats®) in the laboratory reactor

Under the direction of Professor Dr. Vorlop a new method of immobilising microorganisms for nitrification has been developed at the Research Centre for Agriculture in Braunschweig (FAL). These embedded nitrifiers, LentiKats®, enable a high rate of selective ammonium degradation. It also appears possible to significantly lower the oxygen consumption needed for nitrification, meaning considerably lowered costs for the waste water treatment.

Over two years of laboratory tests with LentiKats® at CUTEC's South Hall have shown that nearly complete ammonium elimination with reduced carbon degradation is possible.

Together with geniaLab GmbH, Braunschweig, a pilot plant is being run to verify laboratory results and to optimise the immobilisates. (schä)

Particle Filter and Catalyst to Reduce Exhaust Gas Emissions

Together with industrial partners CUTEC has developed a catalysed self regenerating particle filter system. The filter system fullfills current and upcoming limits set by legislation and reduces particle emission up to 99.9% The R&D-project DEXA (Diesel Exhaust Particulate After Treatment) was sponsored by the European Community.

DEXA project partners with demonstration car

CUTEC's Chemical Processes was involved in all three subprojects of DEXA: Advanced Regeneration Technologies for Diesel Exhaust Particulate After Treatment (ART - DEXA), System Level Optimisation and Control Tools for DEXA (SYLOC - DEXA), and Particulate Size and Composition Measurements for DEXA (PSICO - DEXA). Filter material and active regeneration techniques were developed and optimised within ART – DEXA, whereas a user friendly simulation tool for exhaust gas treatment system was developed under SYLOC - DEXA. In PSICO - DEXA different new analysis methods for particle size measurement and determination of chemical composition of soot particles were developed. Several prototypes of the filter system delivered by the industrial partners were tested on CUTEC's motor test bench. (see photograph right)

The R&D focus was not the filtration of soot itself but instead the filter regeneration. No fuel additives were necessary. Soot particles collected on the filter system were removed by catalytic oxidation within the whole engine map. The pressure drop is below 150 mbar and fuel increase less than 1 %. The system can be easily installed and maintained. The developed particle system was installed in two passenger-cars. Long term test´s of filters in over 60 000 km of use proved successful. (see photograph left) (cl)

CUTEC´s motor test bench

Department of Analytics

from sampling to results

„How high is the hydrogen chloride concentration in the exhaust gas?“ or „how are the heavy metals distributed in a process?“ These are common questions that the Department Chemical Analysis at CUTEC deals with.

Detailed analysis has to accompany almost every process development, for example for the evaluation of the success of an optimisation. About 70 to 80 percent of all analysis by the Chemical Analysis team is for the research done by Physical, Biological, and Chemical, and Thermal Processes Divisions. Chemical Analysis is also offered as external services.

Routine analysis as well as special questions can be handled. The department is fully equipped. Much of the work involves developing analytical methods for new projects, which often mean new matrixes of materials or new components that have to be analysed.

Additionally, regulatory code for example, §26 BImSchG, often calls for standardised methods and sampling procedure. So CUTEC Chemical Technicians not only handle analysis in the laboratory but also take sampling in the field.

The team also is involved in project research. Within the scope of one such project, experiments with a technical scale plant are performed for removing impurities from hydrochloric acid, which cause problems in municipal waste incineration. (sl)

A scientist and two technicians cover the analytical demand for CUTEC

IMPRINT

Publisher: CUTEC-Institut GmbH
Editor: Dr. T. Heere
Authors:
Prof. Dr.-Ing. O. Carlowitz (ca)
Prof. Dr.-Ing. M. Claußen (cl)
Dr. S. Klaus (kl)
Dr.-Ing. B. Kragert (kra)
Dipl.-Ing. S. Schäfer (schä)
Dr. K. Schrickel (sl)
Dr. T. Zeller (ze)
Layout and setting: G. Wessels
Production and supply:
CUTEC-Institut GmbH
Leibnizstr. 21+23
38678 Clausthal-Zellerfeld
Phone +49 05323 933-0
Fax +49 05323 933-100
E-Mail: cutec@cutec.de
Internet: www.cutec.de
Publication:
Several issues per year in irregular order.
The issues can be ordered at the a.m. supply address.

Welcome to CUTEC

Ms Benedix and Mr Schindler

Dipl. - Ing. Michael Schindler started with CUTEC Thermal Processes on 1 April 2003. After studying Processing Engineering at the Georg-Simon-Ohm-Polytechnic in Nürnberg he worked from May 2000 to 2001 in central services as a Project Engineer for Bayer AG. He then continued studies in Processing Engineering with a concentration in Chemical Engineering at the Technical University Clausthal. His Diplom thesis, Investigation and Optimization of an Exhaust Gas Treatment to Reduce Nitrogen Oxide Emission from Diesel Utility Motors, is one whose topic is quite related to work at CUTEC. He is working with the ARTFUEL project, which was introduced in full in the last issue of CUTEC News. He also is working towards the Ph. D.

Dipl. - Biol. Annett Benedix supports the work in Physical and, especially, in Biological Processes since 1 June 2003. She completed her degree in Environmental Engineering at the Polytechnic Mittweida. In January 2002 she began work for the Research Center Mittweida in varying areas of biotechnology and waste water treatment, just the type of work she is now continuing with CUTEC. She will be giving valuable support in the area of Biological Process Engineering. (kl/

New members in the team: Ms Benedix and Mr Schindler

Report by the Works Council

Over the past months, the Committee concentrated on implementing and preparing recommendations for measures to meet CUTEC-specific rules for good scientific work. The Committee also successfully worked on in-house structures on the base of worthy cooperation with CUTEC directorship. In view of the current situation of opportunities for apprenticeships, the Committee also showed support for opening up positions of apprenticeship in for example the machine shop. At present regulations for flexible work hours are being considered. (ze)

Congratulations…

... to Professor Dr.-Ing. Michael Claußen for being called to professorship for Environmental Processing Engineering for Mobile Systems at the Technical University Clausthal. Prof. Claußen also will be heading CUTEC´s Chemical Processes.

Prof. Michael Claußen

A Portrait of the Members of the Scientific Advisory Board

Dr. Werner Brinker in Profile

Dr. Brinker is Chairman of the Board of EWE AG, Oldenburg, and is responsible for Strategic Development. He also manages the buying and selling of electricity and gas, purchasing accounting, marketing, foreign activities and auditing.

He has over 20 years experience in energy management and has been working in his present position since 1998. Since 1996 he has been on the Board of EWE AG. He has held the position as Signatory and Director of the Main Marketing Division with Preussen Elektra AG, now E.ON Energy AG, in Hannover. He started in 1978 with EWE AG and in 1980 took on responsibility for gas purchasing. In 1988 he took on the leadership of the department of Waste Management. Since 1992 he has been working as a confidential clerk. Dr. Brinker both studied Civil Engineering and in 1990 earned a doctorate Dr.-Ing. at the Technical University Braunschweig.

He was born in Lingen in 1952, married since 1980, and has two daughters.

Dr. Werner Brinker

DATES

- CUTEC presentation at the Qutar Water & Electricity Exhibition.
  6 to 8 October 2003 in Doha, Katar
- Meeting of the European network Performance Reliability and Emission Reduction in Waste Incinerators, PREWIN, together with the Uhlig Rohrbogen company in Langelsheim.
  13 and 14 November 2003